PDS Lab Test 1, Problem (b) (January 28, 2022)

Time: 2 hrs, Marks: 20

LT1b. A number of persons present in a shop would like to maintain social distancing. This can be enforced by considering the coordinates of location of a person and the separation between two persons. Let us consider an equivalent problem. Two circles are said to *overlap* if there exists a common point **lying inside or on the boundary** of both circles.

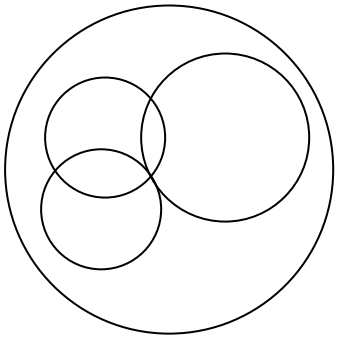

Fig 1 (a)

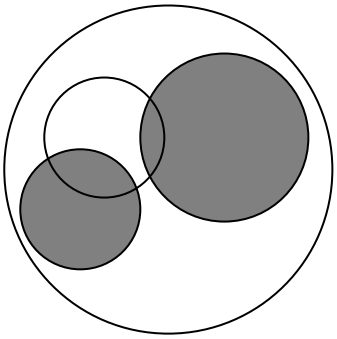

Fig 1 (b)

1. Write a function *overlap(x1, y1, r1, x2, y2, r2)* that receives the centre and radius of two circles as arguments. (*x1, y1*) and (*x2, y2*) are the centres of the two circles having radius *r1* and *r2* respectively. The function returns 1 if the circles overlap and 0 otherwise. **Assume all co-ordinate and radii values are non-negative. Assume all values are integers.**

2. Write a main( ) program that reads the value of an integer *N* and then reads in the centre and radius of *N* circles. Assume *N* < *10*. The radii are stored in an array *R[ ]* and the coordinates of the centres are stored in two arrays, *X[ ]* and *Y[ ]*. The coordinate (*X[k], Y[k]*) represents the centre of the k^{th} circle, while *R[k]* represents the radius of the k^{th} circle. Your program must then use the function overlap() to determine whether **all pairs of circles** overlap. If not, then it must **print the centre and radius** of every distinct pair of circles which do not overlap.

Fig 1(a) shows a case where all pairs of circles overlap. In Fig 1(b) the shaded circles do not overlap. Both figures contain 4 circles.